Decline in solar output unlikely to offset global warming

23 January 2012 - New research has found that solar output is likely to reduce over the next 90 years but that will not substantially delay expected increases in global temperatures caused by greenhouse gases.

Carried out by the Met Office and the University of Reading, the study establishes the most likely changes in the Sun's activity and looks at how this could affect near-surface temperatures on Earth.

It found that the most likely outcome was that the Sun's output would decrease up to 2100, but this would only cause a reduction in global temperatures of 0.08 °C. This compares to an expected warming of about 2.5 °C over the same period due to greenhouse gases (according to the IPCC's B2 scenario for greenhouse gas emissions that does not involve efforts to mitigate emissions).

Gareth Jones, a climate change detection scientist with the Met Office, said: "This research shows that the most likely change in the Sun's output will not have a big impact on global temperatures or do much to slow the warming we expect from greenhouse gases.

"It's important to note this study is based on a single climate model, rather than multiple models which would capture more of the uncertainties in the climate system."

The study also showed that if solar output reduced below that seen in the Maunder Minimum - a period between 1645 and 1715 when solar activity was at its lowest observed level - the global temperature reduction would be 0.13C.

Peter Stott, who also worked on the research for the Met Office, said: "Our findings suggest that a reduction of solar activity to levels not seen in hundreds of years would be insufficient to offset the dominant influence of greenhouse gases on global temperatures in the 21st Century."

During the 20th Century solar activity increased to a 'grand maximum' and recent studies have suggested this level of activity is at or nearing its end.

Mike Lockwood, an expert in solar studies at the University of Reading, used this as a starting point for looking at the most probable changes in the Sun's activity over the 21st Century.

Met Office scientists then placed the projections into one climate model to see how they may impact temperatures.

Professor Lockwood said: "The 11-year solar cycle of waxing and waning sunspot numbers is perhaps the best known way the Sun changes, but longer term changes in its brightness are more important for possible influences on climate.

"The most likely scenario is that we'll see an overall reduction of the Sun's activity compared to the 20th Century, such that solar outputs drop to the values of the Dalton Minimum (around 1820). The probability of activity dropping as low as the Maunder Minimum - or indeed returning to the high activity of the 20th Century - is about 8%. The findings rely on the assumption that the Sun's past behaviour is a reasonable guide for future solar activity changes."

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